ATTACHMENT A

REMARKS

Claim 1 has been objected to because of certain informalities. In particular, the Examiner notes that the claim recites "alternating layers of at least one net positively charged layer or net negatively charged layer" and points out that "an" should be used rather than "or", since "if the layers are alternating, both types of layers must be present." The Examiner is, of course, correct and a corresponding change has been made. The Examiner is thanked for pointing out the need for this correction.

Claims 7-13 and 18 have been rejected under 35 USC 112, first paragraph, as "based on a disclosure, which is not enabling." The Examiner states that the "[s]pecific structural relation between negative and positive layers in the microchannel and the lid critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure." The Examiner also notes that the "specification including drawings specifically discloses several embodiments for various structural relations between positively and negatively charged portions of the microchannel in order for the microchannel device to be enabled. Such relations are missing from the indicated claims, and therefore the device recited is not enabling." In addition, the Examiner points out as an example that "it is not clear, how the microchannel surface should be charged, if the lid is covered with the polyelectrolite layers both positively and negatively charged, as recited in claim 7, to make the device operable."

With respect to claim 7, this claim has been canceled and replaced by new claim 47. Claim 47 is dependent on claim 10, and claim 10 recites that the charges are provided on respective adjacent longitudinally extending portions of the microchannel surface. These claims are, of course, directed to an embodiment such as that illustrated in Figure 2(c) wherein portions of the microchannel are differently charged and portions of the lid are also differently charged. It is respectfully submitted that dependent claim 47, when read in combination with parent claim 10, is fully in accordance with the requirements of 35 USC 112, first paragraph.

Claims 8 and 9 are contended to be "not enabled, since they omit the structural element, which makes the device enabled, i.e. the oppositely charged part of the microchannel." The Examiner further contends that the "microchannel cannot be positively or negatively charged without e.g. lid having the opposite charge to neutralize the microchannel charge." These contentions are respectfully traversed. Claim 1 recites that the polyelectrolyte layers comprise

alternating layers of at least one net positively charged layer and at least one net negatively charged layer. Claims 8 and 9 merely provide specific embodiments of claim 1 wherein, according to claim 8, the outermost layer is a negatively charged layer and, according to claim 9, the outermost layer is a positively charged layer. Regarding the second point, and with all due respect to the Examiner, the specification makes it clear that the microchannel device does not even have to have a lid much less a "lid having the opposite charge to neutralize the microchannel charge."

Claims 8-18, 21 and 39-44 have been rejected under 35 USC 112, second paragraph, as being "indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention." While the Examiner has certainly made some valid points in these rejections, at least one of the rejections is respectfully traversed.

Considering the specific objections raised, claims 8 and 9 are said to be "missing an essential structural part, i.e., the oppositely charged part of the microchannel." For the reasons set forth above, it is believed that claims 8 and 9 are not missing an essential structural part.

Claim 10 has been said to be "indefinite regarding the portions of the microchannel, which are positively and negatively charged" and it is contended that the "structure of the microchannel device with such general description is unclear and indefinite." In order to overcome this rejection, claim 10 has been amended to more clearly set forth the structure of the microchannel device.

Claims 11-13 have been said to be "unclear regarding the disposition of polyelectrolyte layers relative to the structures of the microchannel recited in the claims, which makes the claims unclear and indefinite." Claim 11 has been extensively amended so as to overcome this rejection and, with the changes in claim 11, dependent claims 12 and 13 are believed to be fully in accordance with the requirements of 35 USC 112, second paragraph.

Claims 14-17 are said to be "written in an unclear language." These claims have been amended to address the various points raised by the Examiner and have been simplified with respect to the recitations therein. Moreover, reference has been made to the arms recited in parent claim 7 so as to eliminate some of the confusion to which the Examiner has referred. Claim 16 has simply been canceled while claim 17 has been amended to address the specific point raised with respect to this claim.

Regarding claim 21, this claim has been amended as suggested by the Examiner. Again, the various suggestions of the Examiner are much appreciated.

Finally, with respect to claim 39, this claim has been amended to address the issues raised by the Examiner and is believed to now be fully in accordance with the requirements of 35 USC 112, second paragraph.

Claims 1, 2, 5, 8,. 9, 11-13, 21 and 29 have been rejected under 35 USC 103(a) as being unpatentable over Martynova et al in view of Katayama et al. This rejection is respectfully traversed.

It is noted that with plastics, the variability of electroosmotic flow (EOF) is much more of a problem than with glass microchannels or quartz capillaries. With plastics, there is variability from one type of plastic to another, from batch to batch of the same plastic, and even from one side of a sheet of plastic to the other. These problems are discussed at some length in the introductory portion of the application. As a consequence, it is respectfully submitted that the use of polyelectrolyte multilayers (PEMs) in plastic microchannel devices solves a problem that does not exist in the context of glass or silicone microchannels/capillaries.

The Martynova et al patent relates to the fabrication of plastic microfluid channels. There is no recognition of the problems discussed in the introductory portion of this application and as admitted by the Examiner, the reference does not disclose the use of PEMs disposed along at least a portion of a microchannel surface and comprising layers with alternating net charges.

The Katayama et al patent discloses successive multiple ionic-polymer (SMIL) "capillary coating with successive multiple ionic polymer layers for capillary electrophoresis" as pointed out by the Examiner. There is no teaching or suggestion in the reference that such layers should be applied to plastic microchannels. It is respectfully submitted that the conclusion reached by the Examiner with respect to the obviousness of combining the two references is necessarily the improper product of hindsight, given the actual teachings of these references. As indicated above, the use of PEMs on plastic microchannels solves a problem that does not exist in the context of glass or silica microchannels/capillaries and one that is not recognized by either of the references.

It is also noted that the present invention represents an important advance in the art as is evidenced by the fact that papers regarding this invention have been cited many, many times. The microfluidics field is crowded and even small advances in the art should be considered

significant. The present invention solves an important problem with plastic microfluidic channels and does it in a way that was unobvious from the Martynova et al and Katayama et al patents, given the actual teaching of these references.

Finally, with respect to the rejections of claims 3 and 4, claims 10 and 39-42, claims 19 and 20 and claims 43 and 44, it is respectfully submitted that these claims are patentable for at least the reasons set forth in support of the patentability of the claims discussed above.

Allowance of the application in its present form is respectfully solicited.

END REMARKS